

A NEW GENUS AND SPECIES OF GALL MIDGE (DIPTERA: CECIDOMYIIDAE) DAMAGING FLOWERS OF THE SOUTH AUSTRALIAN SWAMP PAPER-BARK, *MELALEUCA HALMATURORUM* (MYRTACEAE)

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Summary

KOLESÍK, P. (1999) A new genus and species of gall midge (Diptera: Cecidomyiidae) damaging flowers of the South Australian swamp paper-bark, *Melaleuca halmaturorum* (Myrtaceae). *Trans. R. Soc. S. Aust.* 123(1), 31–36, 31 May 1999.

A new species of gall midge, *Austrolopesia melaleucae*, is described from flower galls on *Melaleuca halmaturorum* F. Muell. ex Miq., a salt tolerant tree growing in temporal swamps and saline areas of southeastern Australia. No seeds are produced in infested flowers and the infestation can potentially limit the reproduction of the tree. The larva, pupa, male and female of the new species are described and illustrated. The gall midge is the first record of the tribe Lopesiini in Australia and a new genus is erected to contain it. *Austrolopesia* gen. nov. is compared to other genera of Lopesiini and *Lophodiplosis* Gagné, an Australian genus feeding on *Melaleuca*. The Australian species *Cecidomyia frauenfeldi* Schiner, 1868 from branch bud galls on *Melaleuca* sp. is newly combined in *Dasinera*.

KEY WORDS: Diptera, Cecidomyiidae, *Melaleuca halmaturorum*, wetland, swamp, South Australia.

Introduction

The South Australian swamp paper-bark, *Melaleuca halmaturorum* F. Muell. ex Miq. (Myrtaceae), is a tree of 2–7 m height occurring in South Australia and Victoria (Barlow 1986). It is tolerant to salt and waterlogging and is often found in saline areas bordering permanent wetlands and temporal swamps (Mensforth & Walker 1996). Due to its dominance in these areas, *M. halmaturorum* is a major contributor to the natural groundwater discharge (Denton & Ganf 1994; Mensforth & Walker 1996). Considerable proportions of South Australian soils are degraded by, or under threat of, salinisation (Richardson & Narayan 1995). *Melaleuca halmaturorum* plays an important role in preventing the process of salinisation by keeping the groundwater level low.

The new gall midge modifies flowers of *M. halmaturorum* into hard, hairy galls (Fig. 1). The galls of the type series were collected in September, 1997 in the Coorong National Park by D. Peacock and S. Jennings during a South Australian Animal and Plant Control Commission survey of the ecological response to European rabbit population dynamics. The fact that no seeds are produced inside the galled flowers indicates that the gall midge is a potential limiting factor in the reproduction of *M. halmaturorum*.

Austrolopesia melaleucae gen. et sp. nov. is not closely related to *Lophodiplosis* Gagné, an Australian genus containing species modifying leaves and buds of *Melaleuca* spp. (Gagné *et al.* 1997), nor to any other known genus and therefore a new genus has been erected. The new gall midge is the first Australian record of Lopesiini, a tribe known previously only from the Americas and Africa. *Austrolopesia* gen. nov. differs from *Lopesia* Rübsaamen, the catch-all genus of the tribe, in gynandromorph male antennae, and from all other genera of the tribe in the long female postabdomen.

Cecidomyia frauenfeldi Schiner (1868) described from branch bud galls on *Melaleuca* sp. in Sydney, Australia, is placed for the first time in the genus *Dasinera* (comb. nov.). It does not belong in



Fig. 1. Flower gall of *Austrolopesia melaleucae* sp. nov. on *Melaleuca halmaturorum*. Scale bar = 10 mm.

Cecidomyia, formerly used as a catch-all genus but now restricted to species whose larvae feed on resin in Pinaceae. The species fits *Davineura* because it has toothed tarsal claws, an R₅ wing vein that meets C anterior to the wing apex and the female eighth tergite divided into two longitudinal sclerites.

Materials and Methods

Flower galls on *Melaleuca halmaturorum* were collected at the Coorong National Park on 2.ix.1997. The galls were processed in one of two ways. Some were cut open and the larvae preserved in 70% ethanol. Others were kept in plastic bags and the larvae reared to adults. Pupation took place within the galls. Emerged adults were preserved together with their pupal skins in 70% ethanol. Microscope mounts of the type series were prepared according to the techniques outlined by Kolesík (1995). The type series and other material retained in 70% ethanol, together with dried galls, are deposited in the South Australian Museum, Adelaide [SAM], the Australian National Insect Collection, Canberra [ANIC] and the State Herbarium of South Australia, Adelaide [SHSA]. Descriptions and measurements refer to the holotype and paratypes.

Genus *Austrolopesia* gen. nov.

Type species: *Austrolopesia melaleucae* sp. nov.

Adult

Head: Antenna: flagellomeres gynecoid in both sexes, 12 in number, first and second fused, longer than remaining ones, circumfila simple. Eye facets close together, rounded, eye bridge 6-8 facets long. Labella large, triangular in frontal view. Palpus 4-segmented.

Thorax: Wing with R₅ bent at its juncture with R₄, joining C posterior to wing apex, R₅ situated closer to end of R₄ than areolus, M₂₊₃ present as fold, Cu forked. First tarsomere with small ventroapical tooth. Claws toothed, bowed near basal third, empodium reaching bends in claws.

Abdomen: Sclerites entire, rectangular, with setae sparse, distributed evenly except dense posterior row and anterior pair of trichoid papillae. Male genitalia: gonocoxite elongate, cylindrical, with obtuse mesobasal lobe; gonostylus tapered distally, swollen and setulose on basal third, asetose and ridged beyond; aedeagus long, stout, tapered distally, with several large asetose papillae; hypoproct bilobed, each lobe with two setae; cerci shorter than hypoproct, with several setae on each lobe. Female genitalia: ovipositor protrusible, long; cerci large, fleshy; hypoproct small.

Pupa

Antennal horns short, angular. Frons on each side, one of two lower facial papillae setose, one of three lateral facial papillae setose. Prothoracic spiracle slightly bowed, with trachea reaching its apex. Abdominal segments II-VIII dorsally with fields of spines on anterior half.

Larva

Integument of abdominal segments covered dorsally and laterally with large spiculae, ventrally with small spiculae anteriorly, smooth elsewhere. Sternal spatula bilobed. Papillae generally as in *Cecidomyiidae* (Gagné 1989) with ventral papillae asetose and 4 of 8 terminal papillae with corniform setae. Anus ventral.

Etymology

Austrolopesia combines the prefix "austro", referring to Australia, with *Lopesia*, the name of the type genus of the tribe *Lopesiini*.

Remarks

Austrolopesia gen. nov. belongs to the tribe *Lopesiini* (sensu Gagné 1994) because it has the following characters: R₅ wing vein is closer to the end of R₄ than to the areolus, R₅ is bent at its juncture with R₄, claws are bent near the basal third and the female cerci are large and fleshy. *Lopesiini* is a tribe of *Cecidomyiidae* that is not well known. It contains seven genera recorded previously, with eight South American, one North American and three African species creating galls on plants from the families Boraginaceae, Chrysobalanaceae, Leguminosae, Melastomataceae, Polygonaceae and Rosaceae (Gagné & Marohasy 1993; Gagné 1994; Gagné & Hibbard 1996; Maia 1996). The gall midge described here is the first species of this tribe known to feed on Myrtaceae and is the only member of *Lopesiini* known from Australia. *Austrolopesia* differs from all other genera of this tribe in the prolonged ovipositor and, except for *Cordiomyia* Maia and *Ctenodactylomyia* Felt, in the gynecoid male flagellomeres. The new genus appears to be morphologically closest to *Cordiomyia*, a monospecific genus originally not assigned to tribe level but evidently belonging in *Lopesiini* (Maia 1996). *Cordiomyia globosa* Maia, a species forming leaf galls on *Cordia verbenaceae* DC (Boraginaceae) in South America, differs from the new species in the following characters. In *C. globosa*, the adult has a long and narrow postvertical protuberance on its head, a three-segmented palpus, the aedeagus is shorter than the hypoproct, the gonostylus barely tapers and is swollen at its basal fourth, and the ovipositor is protrusible but short; the pupa has long

and bifid horns at the base of the antennae; the prothoracic spiracle is strongly bent at its distal fourth; the larva has eight terminal papillae, all with corniform setae. In *Austrolopesia melaleucae* gen. et sp. nov. the adult has a short and wide postvertical protuberance on its head, a four-segmented palpus; an aedeagus longer than the hypoproct, a tapering gonostylus which is swollen at its basal third and a long and protrusible ovipositor; the pupa has short and angular cephalic horns, the prothoracic spiracle is slightly and evenly bent; the larva has eight terminal papillae, four with pointed setae and four with corniform setae.

Austrolopesia differs from *Lophodiplosis* Gagné, an Australian genus galling *Melaleuca* spp. in Queensland (Gagné et al. 1997), in several characters. In *Austrolopesia*, the tarsal claws are curved near the basal third, the male flagellomeres are gynecoid and bear simple, closely appressed circumfila, all setae on the female cerci are simple, the pupa has no protuberances on the vertex and bears dorsal spines on the abdomen; the larva has a sternal spatula with a long, narrow shaft and the terminal segment bears eight robust papillae, four with corniform setae and four with strong, short, pointed setae. In *Lophodiplosis*, the tarsal claws are curved beyond the mid-length, the male flagellomeres are binodal with three looped circumfila, the female cerci bear setiform sensoria in addition to the setae; the pupa has large protuberances on the vertex and no dorsal spines on the abdomen; the larva has either a sternal spatula with a short, wide shaft or no spatula at all, and the terminal segment bears two or four minute, setose papillae.

Austrolopesia melaleucae sp. nov.
(FIGS 2-18)

Holotype: ♂, Coorong National Park, "Loop Road", South Australia [36° 11' S, 139° 41' E], 23.ix.1997, reared by P. Kolesik from flower galls on *Melaleuca halmaturorum* F. Muell. ex Miq., gall collected 2.ix.1997 by D. Peacock and S. Jennings, 121410 [SAMA].

Paratypes: 3 ♀♀, 2 pupal skins [SAMA, 121411-121415], ♂, 2 ♀♀, pupal skin [ANIC], same data but emerged 23.ix.-9.x.1997; 3 larvae [SAMA, 121416-121418], 2 larvae [ANIC], collected with holotype.

Other material: 11 larvae, collected with holotype [SAMA].

Male (Figs 2-8)

Colour: eyes black, head dark brown, antennae grey, palpi grey with black scales, thorax and abdomen orange, genitalia light brown, legs grey

with black scales. Antenna: scape and pedicel slightly longer than wide, last flagellomere with apical nippel; circumfila simple, thin; circumfilar attachment points dense; setae short, thin. Postvertical protuberance on head short, bearing 2-4 strong setae. First palpal segment short, second and third longer, equal in length, fourth longest. Frons with 3-4 setae per side. Wing 2.5 mm long, 0.8 mm wide (n=1, the second specimen with one wing missing and the second deformed in the process of mounting).

Female (Figs 9-13)

Colour as in male. Head: frons with 3-5 setae. Thorax: wing length 1.8 mm (range 1.7-1.9, n=5), width 0.8 mm (0.8-1.0). Ovipositor 2x longer than tergite 7, with setae evenly distributed on segment 9; cerci with simple setae, setulose; hypoproct with 2 setae, setulose. Other characters as in male.

Pupa (Figs 14, 15)

Colour: antennal horns, prothoracic spiracle and dorsal spines dark brown, remaining parts pale brown. Length 1.8 mm (1.6-2.2, n=3). Cephalic papillae 46 µm (46-47) long. Frons with all setae short. Prothoracic spiracle 150 µm (134-173) long. Abdominal segments dorsally with fields of 4-15 spines on anterior half.

Larva (Figs 16-18)

Colour: orange. Length 1.8 mm (1.7-1.9, n=5). Head with antennae 2x longer than wide, posterolateral apodemes as long as head capsule. Sternal spatula 177 µm (157-211) long, with apical enlargement 46 µm (39-54) wide, depth of incision 25 µm (24-29).

Etymology

The name *melaleucae* means "of *Melaleuca*".

Gall and biology

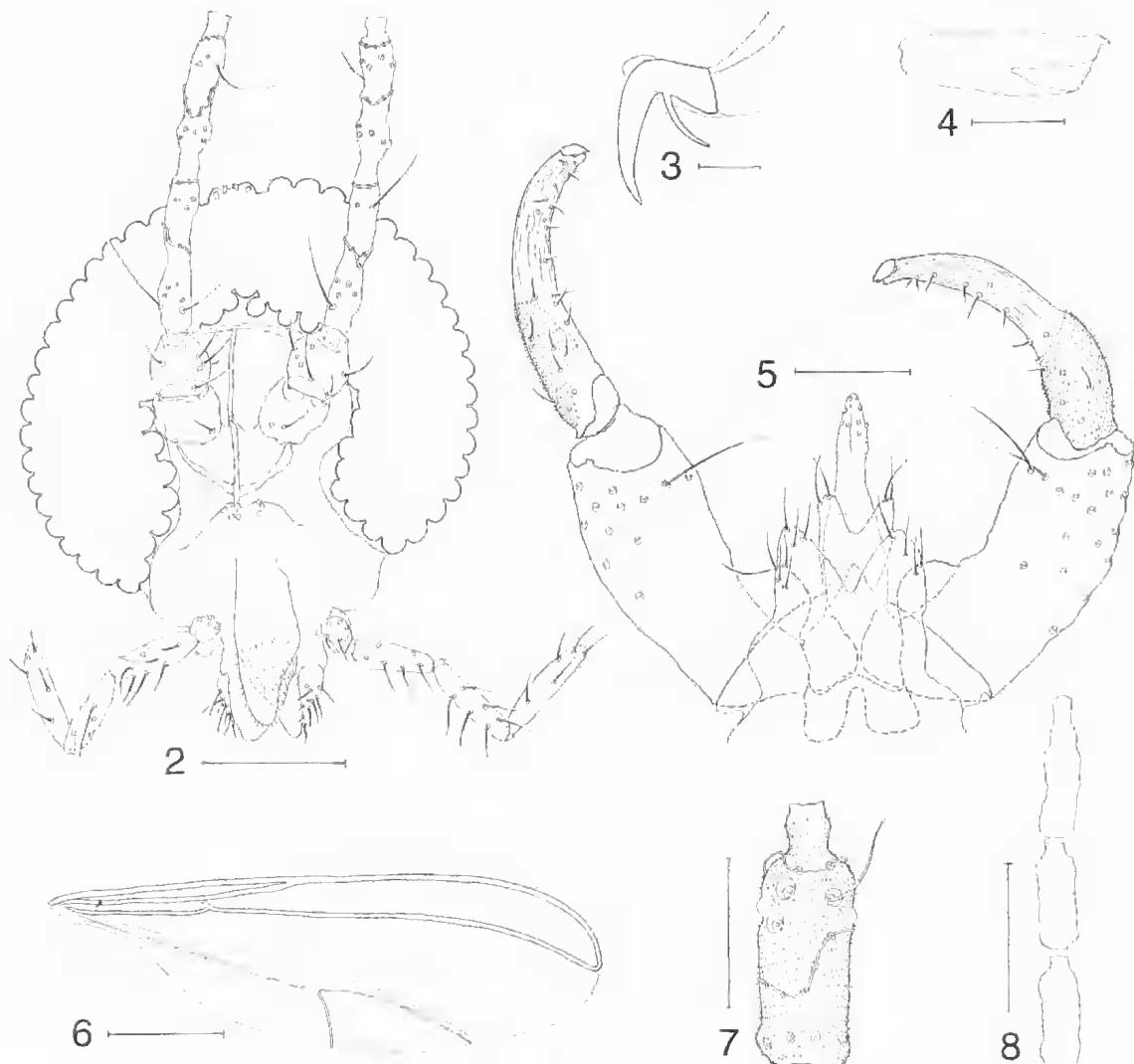
The sexual organs of the flower of *Melaleuca halmaturorum* are modified by the new gall midge into an ovoid, woody gall covered with dense, grey hairs (Fig. 1). The gall, 6-10 mm in length and 5-8 mm in width, consists of two hemispheres connected by a longitudinal suture with a small, bald nippel at the apex. Inside the gall is a small, ovoid chamber occupied by one larva. The chamber wall is 1.5-3 mm thick. The sepals and petals on the base of the gall are not modified. No seeds are produced within galled flowers. Pupation takes place within the gall. At the end of its development the pupa inserts most of its body through the suture between the hemispheres of the gall, the pupal skin splits open and the adult emerges. The empty pupal skin stays attached to the gall long after adult emergence. Some galls collected with the type series showed small, round openings, presumably created by parasitoids.

Remarks

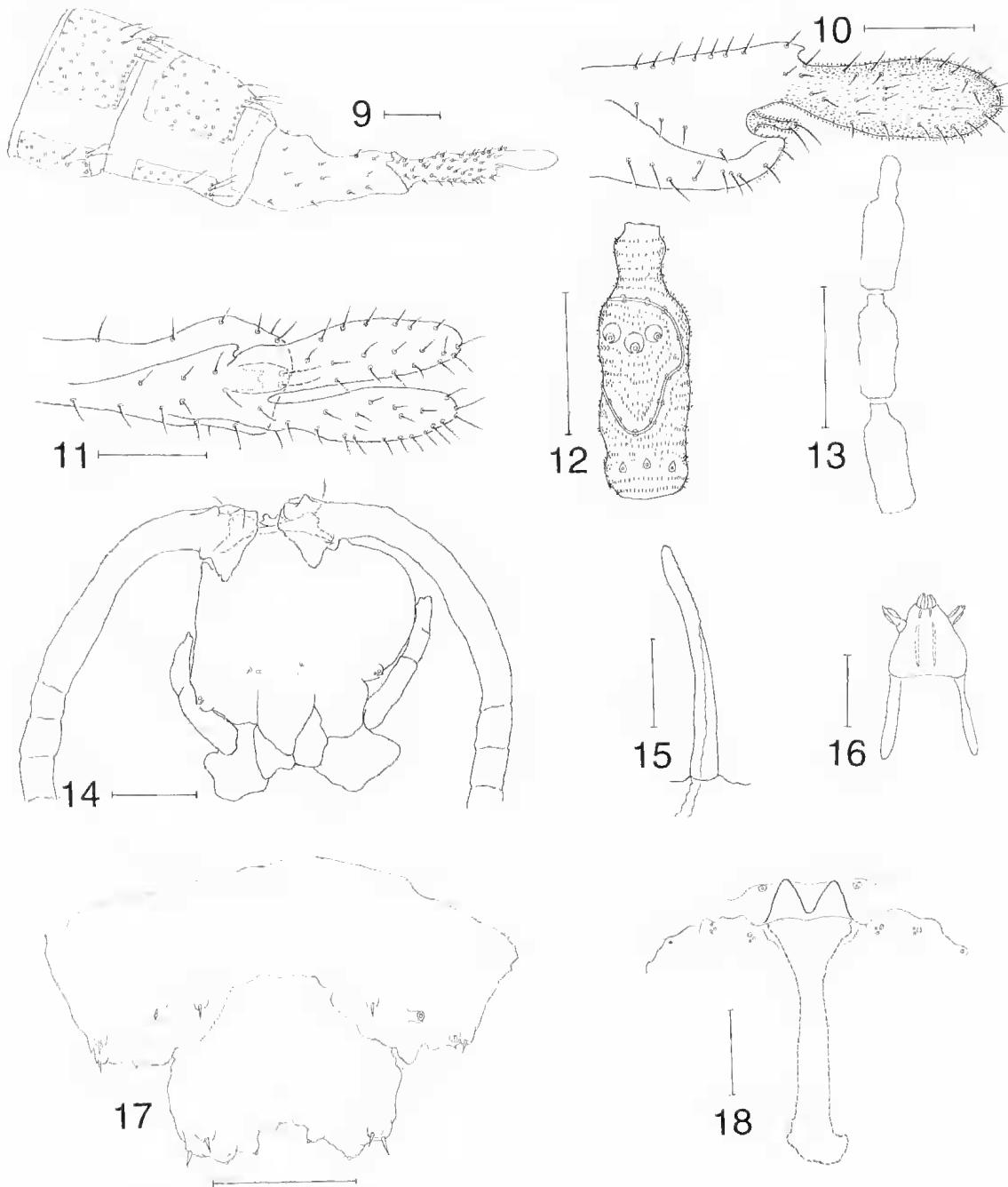
The new gall midge is different from *Dasineura frautenfeldi* (Schiner) (comb. nov.), a species described in 1868 from branch bud galls on *Melaleuca* sp. in Port Jackson, Sydney. In *D. frautenfeldi*, the R₅ meets C anterior to the wing apex, the aedeagus is sheathed by parameres, and the female eighth tergite is split into two longitudinal sclerites. In *A. melaleucae*, the R₅ meets C posterior to the wing apex, the male parameres are not present, and the female eighth tergum is not sclerotised.

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Figs 2-8. Male of *Austrolopesia melaleucae* sp. nov. Fig. 2. Head in frontal view. Fig. 3. Tarsal claw and empodium. Fig. 4. First tarsomere. Fig. 5. Genitalia in dorsal view. Fig. 6. Wing. Fig. 7. Sixth flagellomere. Fig. 8. Last three flagellomeres. Scale bars = 100 µm 2, 8; 10 µm 3; 50 µm 4, 5, 7; 500 µm 6.



Figs 9-18. *Austrolopesia melaleucae* sp. nov. 9-13 female, 14-18 larva. Fig. 9. End of abdomen in lateral view. Fig. 10. Ovipositor in lateral view. Fig. 11. Ovipositor in dorsal view. Fig. 12. Sixth flagellomere. Fig. 13. Last three flagellomeres. Fig. 14. Anterior part in ventral view. Fig. 15. Prothoracic spiracle. Fig. 16. Head in ventral view. Fig. 17. Last two abdominal segments in dorsal view. Fig. 18. Spatula with adjacent papillae. Scale bars = 100 µm 9, 13, 14, 17, 18; 50 µm 10 - 12, 15, 16.

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